

**REQUEST FOR INFORMATION (RFI)**

**APPLIQUE KIT OF SENSORS AND CONTROLS FOR ROUTE  
CLEARANCE AND INTERROGATION SYSTEMS (RCIS)**

**09 MAY 2013**

# **REQUEST FOR INFORMATION (RFI) ROUTE CLEARANCE AND INTERROGATION SYSTEMS**

## **I. PURPOSE**

This Request for Information (RFI) solicits industry input to determine industry capability to develop and produce systems that enable remote control and semi-autonomous control of the specified ground vehicles. Participants' input shall include a narrative that describes a candidate system or technology, the intent of the system identified in Appendix A - Requirements Overview, and the basis for those assertions (e.g., test data for similar systems).

This announcement is solely for research purposes; there will be no contract award as a result of this announcement. This is not a Request for Proposal (RFP) or an announcement of a forthcoming solicitation, nor does this announcement imply or guarantee one will be issued in the future. Also, this RFI is not a request seeking contractors interested in being placed on a solicitation mailing list. Response to this questionnaire is voluntary and the Government will not reimburse any costs associated with providing information in response to this market survey or for any follow-on information requests.

It is not necessary to respond to this announcement in order to be eligible for future contract awards.

## **II. INSTRUCTIONS FOR RESPONDING TO THIS REQUEST**

Responses to this request for information should be sent via e-mail to Brent Wisniewski at [brent.l.wisniewski.civ@mail.mil](mailto:brent.l.wisniewski.civ@mail.mil) and Ray Folden at [raymond.g.folden.civ@mail.mil](mailto:raymond.g.folden.civ@mail.mil). You are requested to put "RCIS EFFORT" in the subject line of the e-mail. Any request for clarifications shall also be addressed to Brent Wisniewski at [brent.l.wisniewski.civ@mail.mil](mailto:brent.l.wisniewski.civ@mail.mil) and Ray Folden at [raymond.g.folden.civ@mail.mil](mailto:raymond.g.folden.civ@mail.mil).

Responses to the RFI are due on 10 JUNE 2013.

Any information that cannot be sent via email can be sent on two (2) identical CDs to the following address:

U.S. Army Contracting Command - Warren  
ATTN Brent Wisniewski /CCTA-AHK-C  
6501 East 11 Mile Road  
Mail Stop 509 (BLDG 229)  
Warren, MI 48397-5000

### III. INFORMATION REQUESTED FROM INDUSTRY:

#### 1. **Manufacturer**

a. Name:

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b. Mailing Address:

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c. Website:

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#### 2. **Personnel Responding to RFI**

a. Name:

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b. Title:

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c. Company Responsibility/Position:

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d. Telephone/Fax Numbers:

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e. E-Mail Address:

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f. CAGE (commercial and government entity) Code (if any):

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#### 3. **Survey Questions**

- a. Based upon the information specified in Appendix A, please describe your company's potential solution to the Government's requirement. Are these commercial item(s)? Are they in current production?

- b. For all solutions identified, provide any literature, photographs, characteristics and specifications to substantiate the capability and performance levels.
- c. For all solutions identified, provide any relevant Government or commercial testing documentation. For Government testing, please provide agency contact information.
- d. Identify areas where our requirements, located in Appendix A, can be exceeded with existing technology, or technology currently in development.
- e. Provide details of any current/future plans to implement such capability, to include timeline and date of implementation.
- f. Are the requirements in Appendix A attainable? Please provide an explanation of any requirements that are not attainable.
- g. Provide approximate lead times for the development of the system.
- h. Please provide the system integration requirements such as weight, space, and power.
- i. Please provide an overview to the system software development maturity model. Please provide any 3<sup>rd</sup> party certifications.
- j. Please provide brief overview of the offer's manufacturing capability. Please include any 3<sup>rd</sup> party certifications.
- k. Are you aware of the Robotic Systems Joint Project Office (RS JPO) sponsored Interoperability Profile (IOP)? Does the proposed technology comply with IOP? If not, are there plans to incorporate the IOP into future designs? The IOP can be found at: <http://www.rsjpo.army.mil>
- l. Please provide prototype, sustainment and production data.
- m. Please provide any additional, relevant information appropriate to this RFI.

## **Appendix A**

### **APPLIQUE KIT OF SENSORS AND CONTROLS FOR RCIS REQUIREMENTS OVERVIEW**

#### **1. Summary**

The Route Clearance and Interrogation System (RCIS) of two vehicles, RCIS Type I, based on the High Mobility Engineer Excavator – Type I (HMEE-1) and RCIS Type II, based on RG-31 / Mine Resistant Ambush Protected (MRAP) Vehicle. Each vehicle will have an appliqué suite of sensors and controls to enable unmanned, semi-autonomous, remote control of all the vehicles functions so that it can be operated at a standoff from explosive hazards. This RFI is specific to the appliqué kit needed to enable the unmanned, semi-autonomous, remote control.

Type I will be an excavator (High Mobility Engineer Excavator (HMEE)-Type I (LIN 1153576)), currently assigned to route clearance and combat construction units. With modular payloads, it will provide force protection and enable Soldiers to semi-autonomously excavate, interrogate and classify deep buried IEDs, explosive hazards, and caches; neutralize explosive hazards; operate in confined/urban areas; and prevent threat forces from using concealed locations to reseed routes with explosive hazards. The Original Equipment Manufacturer for the HMEE is JCB Defense Products.

Type II will be a blast protected/resistant vehicle (RG-31 /MRAP). With modular payloads, it will provide force protection and enable Soldiers to semi-autonomously detect, neutralize, and proof explosive hazards with Government Furnished Equipment (GFE), including an explosive hazard roller, debris blower, electronic countermeasures device, infrared neutralizing device, and trip/command wire detonating device. The Original Equipment Manufacturer for the RG31 is General Dynamics Land Systems.

This RFI is specific to the appliqué kit of sensors and controls needed to enable the unmanned, semi-autonomously controlled mode, an Operator Control Unit (OCU) mounted in a separate control vehicle and the integration of the appliqué kit on each base vehicle.

#### **2. Operating Environment**

The System of Systems (SoS) RCIS capabilities will operate in terrain varying from open rolling to complex terrain; in confined areas; with mobility on primary and secondary roads and trails, and during limited cross-country movements. Operations will take place during daylight and during night, in limited visibility, and in inclement weather.

### **3. Technology Overview and Integration Strategy**

RCIS appliqué suite shall be designed to be scalable and upgradable to add new operating modes. The RCIS appliqué suite of sensors and controls will enable the following operating modes and features.

#### **System Off/ Manned Mode**

In System Off Mode the vehicle shall perform as if the appliqué suite was not installed. The platform will operate in manned mode with base vehicle functions.

#### **3.1. Teleoperation**

Teleoperation Mode is the operation of an unmanned robotic system in which the operator may not have line of sight to the robotic system and controls it through a remote station. In this mode, the operator must rely on sensors, video streams and vehicle diagnostics to provide sufficient information to control the vehicle.

#### **3.2. Waypoint Navigation**

Waypoint Navigation Mode is a robotic path planning method for the robotic system using sets of coordinates to identify points on a path that the robot needs to traverse. The waypoint path is designated by a human operator.

#### **3.3. Follower**

Follower Mode allows an unmanned vehicle to maintain a formation with a high degree of precision. The operator control unit (OCU) shall be able to communicate its path to the follower and / or the follower shall autonomously follow a designated leader. The follower vehicles shall follow the path or defined formation of the lead vehicle.

### **4. Summary of Key Performance Requirements**

#### **4.1. Type I Platform & Speed**

The Type I will be a highly mobile, self-deployable excavator — High Mobility Engineer Excavator-1 (HMEE-1) (LENH53576). J1939 CAN Bus signals for control of platform functions will be provided as Government Furnished Equipment. . The Type I in manned and unmanned modes will be capable of operating at an average speed of 8 kph during route clearance operations, 25 kph during operational movements and 48 kph maximum.

## 4.2. Type II Platform & Speed

The Type II will be based on the RG31/MRAP, a highly mobile, self-deployable, blast protected/ resistant vehicle. The Type II in manned and unmanned modes will be capable of operating at an average speed of 8 kph during route clearance operations, 25 kph during operational movements and 48 kph maximum.

## 4.3. Type I and Type II Capabilities: Semi-Autonomous Control (SAC)

4.4. The SAC shall enable remote control of the vehicle and functions from a workstation in a control vehicle. The remote, semi-autonomous control capability can be deactivated to allow operation of the platform in the manned mode. Threshold control range is 200m Line of Sight (LOS) and 100m Non-Line of Site (NLOS). Objective control range is 500m LOS and 500m NLOS.

The SAC capability is envisioned as a modular appliqué system consisting of a Mobile Base Unit (MBU) located in the Type I and Type II vehicles and an Operator Control Unit (OCU) located in the control vehicle. MBUs and OCUs need to be common and standardized to the maximum extent to improve cost effectiveness.

- a) Type I capabilities to be remotely controlled are automotive functions, interrogation and classification capability, excavating capability, and lifting and moving explosive hazards capability.
- b) Type II capabilities to be remotely controlled are automotive functions, debris blower controls, ECM device on-off; safety warning capability on/off and alarm signal, and IR device on/off.
- c) The MBU and OCU will provide transmission links that are in a closed loop system, point to point, and only be capable of transmitting data to/from the OCU and MBU at the threshold distances.

The OCU shall display automotive functions for both Type I and II referenced above to include video output, video camera controls, engine start/stop, speed and braking, platform steering, emergency shutdown, automotive and maintenance gauge and sensor information. The OCU must be stabilized and provide controls that are ergonomically designed. It will be easy to locate, simple to operate with minimal (less than 5%) risk of error, and compatible with military night vision equipment.

The system will include a handheld, remote OCU to control all functions by a dismounted Soldier (Type 1 only).

The OCU (including video display and controls) and required accessories is to be mounted at a workstation in the control vehicle. The operator will employ the OCU to send commands to and receive signals and video from the MBU to control all functions of the Type I and Type II.

The OCU will record video streams and still photos on a removable storage device compatible with standard Army-issued commercial hardware and software.

#### 4.5. Type I and Type II Capability: Visual Scan Area

The operator at the OCU workstation, while controlling the Type I and Type II, either stationary or while on the move, will have the capability to visually scan 360 degrees around the platforms and to identify and recognize the following:

- a) a stationary and moving person wearing an Army Combat Uniform and standing upright at a distance of 3 m through 100 m.
- b) primary and secondary roads and road signs at a distance of 3 m through 100 m
- c) Standard hazards signs and markers (e.g., minefield marking signs and lane markers) readily identifiable in daylight, clear conditions, at a distance of 3 m through 30 m
- d) Various, unspecified objects of interest to a route clearance team at 3 m through 30 m. A stationary vehicle (e.g., Toyota Tacoma standard two-door) at 1,200 m in all terrain and environmental conditions.

#### 4.6. Type I and Type II Capability: Platform Cameras

The semi-autonomous control capability must include mounted, stabilized camera(s) that produce high resolution image quality digital video stream to be sent to the OCU display screen to enable the operator to view and semi-autonomously control. The cameras must be mounted with unobstructed views of the movement. An operator using the OCU must be able to operate and control the functions of the camera(s). The system must provide a continuous, clear video stream capable of being halted to clearly examine selected frames on the OCU display. It must display high-resolution, distinguishable images, multi-colors, and alpha/numeric characters on the OCU. The system must have the ability to zoom and to tilt and pan to provide the operator with a visual field with forward visibility through a lateral visual field of at least 180 degrees, and ground view at all distances beyond 3 m in front of the vehicle and upward visibility of not less than 15 degrees above the horizontal; and operate at day and night. Mirrors may be used to meet the ground view requirement.

#### 4.7. Emergency Shutdown



The Semi-autonomous Control Capability will have an emergency shutdown that the operator via the OCU can employ to immediately stop and/or shut down the Type I and Type II.

#### 4.8. Type II Capability: Safety Warning System - Operations

The Type II system will provide a Safety Warning Capability, a modular payload, to sense objects in the path of the vehicle and provide a warning to the operator. Alarms will be received in the vehicle and on the OCU to alert the operator. The operator can adjust the warning threshold location/distance, audible warning volume, and may temporarily disable the object sensing devices. It will be safely employed in both the manned and unmanned modes of operation.

The Safety Warning Capability will have visual and audio alarms on the vehicle and at the OCU IAW MIL-STD-1472.

The object sensing devices will sense moving and stationary vehicles (Toyota Tacoma standard two-door vehicle or larger) and personnel (standing upright wearing an Army Combat Uniform) on or alongside of a route to the front, rear, and sides of the Type II.

Each object sensing device will operate independently and will be capable of being separately activated / deactivated.

The forward looking object sensing device will have an object sensing distance of 3-50 m LOS and minimum width of 15 m LOS at a distance of 50 m LOS

The rearward looking object sensing device will be an object sensing distance of 0.10-30 m LOS and width of 10 m at 30 m LOS.

The side looking (left and right) object sensing devices will have an object sensing distance of 0.10-8 m LOS and width of 5 m at 8 m LOS.

#### 4.9. Type I & Type II Capability: Mission Profile and Operating Environment

RCIS capabilities during missions will operate in varying terrain in accordance with Field Manual 5-33:

Terrain Type	Percentage
Primary Roads	45%
Secondary Roads	39%
Trails	14%
Cross Country	2%

The Safety Warning Capability will operate during daytime, night, and low visibility including fog, smoke, haze, rain, snow, and blowing sand.

Operators will operate the capabilities from inside the control vehicles while equipped with individual combat equipment (Army Combat Uniform, Advanced Combat Helmet, Interceptor Body Armor, Military Combat Eye Protection, and individual weapon), and Mission Oriented Protective Posture Level (MOPP) IV, Extended Cold Weather Clothing System and wet weather protective equipment and clothing.

The RCIS Type I will be capable of worldwide operations in a temperature range of -25 to +120 degrees F in Hot and Basic climatic design types defined in AR 70-38 without special procedures or kits.

The RCIS Type II will be capable of worldwide operations in a temperature range of -25 to + 135 degrees F in Hot and Basic climatic design types defined in AR 70-38 without special procedures or kits.

#### 4.10. Type I & Type II Capability: Other Design Considerations

[The appliqué system shall not degrade the host vehicle survivability, transportability, and deployability attributes.](#)

The Type I and Type II and their subsystems and modular payload capabilities will not interfere with the controls or degrade the automotive performance (including, but not limited to, steering, turning, speeds, braking, grade, slope, etc.) of their host vehicles by more than 10% (T); will cause no degradation (O).

The Type I and Type II will be capable of fording fresh and salt water to a depth of 1m.

The Type I and Type II will have 12- and 24-volt DC electrical systems that are waterproof and meet fording depth requirements.